REMARKS

This paper is responsive to the Office Action mailed August 25, 2006. Claim 1 has amended to recite that detection of ethane is carried out by detecting variations in solar radiation reflected from the target area. This amendment is supported by the disclosure in paragraphs 07 and 27-32, as filed. Claim 19 was previously cancelled. Claims 26-31 are cancelled without prejudice consequent upon this amendment. Claims 1-18 and 20-25 are thus pending in the application. Reconsideration and allowance of the application is requested.

Claims 1, 2, 5, 7, 11, 12, 13, 15, 16 and 26 are rejected under 35 U.S.C. § 102(e) as being anticipated by Nelson et al ("Nelson", U.S. Patent No. 6,750,453). Applicants respectfully traverse this rejection.

Claim 26 has been cancelled, thus rendering the rejection moot. Nelson is distinguished from Claims 1-17 by the recitation of detecting the presence of ethane by detecting variations in solar radiation reflected from the target area. Nelson provides his own light source as a source of radiation to be detected.

The Examiner rejected the now cancelled Claims 28-31, which contained the limitation that ambient background radiation is used as a source of radiation to be detected, based upon J. Sandsten et al. ("Real-Time Gas-correlation Imaging Employing Thermal Background Radiation"). Claim 1 is distinguished by requiring "detecting variations in solar radiation reflected from the target area". Sandsten et al. uses thermal radiation at wavelengths of 7-13 μm, which is outside the bandwidth of reflected solar radiation.

Hence, Claims 1, 2, 5, 7, 11, 12, 13, 15, 16 are believed patentable over Nelson, and Nelson in view of Sandsten.

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Claims 3 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson et al. in view of Hodgkinson. Applicants respectfully traverse this rejection.

Nelson is distinguished as indicated above and this is sufficient to dispose of the rejection. In addition, the following arguments apply.

The Examiner recognizes that Nelson et al. does not disclose the claimed bandwidth of 2850-2975cm-1, but recites Hodgkinson as disclosing this bandwidth in his Fig. 2.

Although Fig. 2 shows a much wider band for ethane than is known in the Hitran database, what Hodgkinson does not show is whether this band has any fine-scale structure (absorption lines). The Hodgkinson reference shows a very low resolution scan of the C2H6 band at 3000cm-1 with very little information as to what the figure represents or how the measurements were made. As a consequence it is almost impossible to tell whether the absorption feature represents anything new above the Hitran data, and impossible to tell whether the absorption feature contains any new absorption lines.

For the GFCR technique to work, it requires that the gas being measured has fine-scale (spectral) line structure as disclosed in Fig. 3 of the present application. In other words, the individual absorptions lines have to be distinct under typical measurement pressures and temperatures. The GFCR technique uses a sample of the gas of interest as a "spectral filter" to select wavelengths over a wide pass-band where the gas of interest absorbs. In other words, to first order, a GFCR measures the gas of interest only at wavelengths where the gas has absorption line. This provides two distinct and very important advantages. First, by selecting only wavelengths where absorption of the gas is located, sensitivity to that gas in significantly increased. Second, by selecting only wavelengths where the gas of interest absorbs, it reduces the interference of other gases which may have absorption lines in the same spectral region. Since most of the absorption lines of the interfering gases will not overlap the lines of the gas of interest, sensitivity to interference by other gases is minimized. If a GFCR is used to detect a gas

in which the absorption band does not contain any fine structure (as is shown in the Hodgkinson patent), the GFCR will have very little selectivity for the gas of interest. Any interfering gases (gases with absorption lines within the band such as water) will interfere substantially with the measurement, producing erroneous signals. For ethane, it is not immediately clear that fine-structure in the band should exist. And, Hodgkinson's data does not suggest it does. All that can be said from the Hodgkinson patent is that there seems to be a larger than expected broad absorption feature in ethane at 3.35 μm from a spectral measurement of an unknown spectral resolution of an unknown quantity of ethane. This figure does little to suggest that this absorption feature might make a good spectral band for measuring C2H6 with a GFCR.

Consequently, for these additional reasons, it is submitted that Claims 3 and 8 are patentable over the cited references.

Claims 4 and 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson et al. in view of what is old or well known. Applicants respectfully traverse this rejection.

Nelson is distinguished as indicated above and this is sufficient to dispose of the rejection. In addition, the following arguments apply.

If this rejection is based on Hodgkinson, that rejection is dealt with by the argument presented above in relation to Claims 3 and 8. If the rejection is based on the allegation that "any specific band would have been an obvious design choice," that is incorrect. Various factors dealt with above in relation to the Hodgkinson reference make the selection of the band more than routine skill. A specific absorption peak of a target gas must provide adequate absorption bands, as well as not include interfering bands of other absorbers, and provide a sufficiently strong signal over background that the signal is detectable.

Claims 6, 10, 14, 18, 20, 24 and 25 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson et al. in view of French et al. Applicants respectfully traverse this rejection.

In respect of Claims 6, 10 and 14, Nelson is distinguished as indicated above and this is sufficient to dispose of the rejection.

In respect of Claims 18, 20, 24 and 25, the following additional arguments apply. French et al. is cited as disclosing a bi-prism, but the device of French et al. does not cause the light through the prism to diverge as claimed in Claim 18, but instead causes it to converge to produce an interference pattern. The interference pattern is used for detection.

In the art, it is common to use a partially reflective mirror to achieve separation of light beams. In the claimed bi-prism, light is not partitioned using a reflected component nor caused to converge, but instead is partitioned using the transmitted components of two portions of a bi-prism. As shown in Fig. 2 of the present disclosure, the energy passing through the system is partitioned biaxially. Energy passing through each half of the optical chain are imaged offset from each other. The distance between the images is a function of the angle of the prisms. This technique minimizes polarization problems, partly due to the fact that the angles of the prism surfaces relative to the optical axis are small. Hence, Claim 18 as well as Claims 20, 24, and 25 are patentable over the cited art.

Claim 17 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson et al. in view of Smith et al. Applicants respectfully traverse this rejection. Nelson is distinguished as indicated above and this is sufficient to dispose of the rejection since Smith does not disclose the missing teaching.

Claims 21-23 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson et al. in view of French et al. and Hodgkinson. Applicants respectfully traverse this rejection.

The argument provided in respect of Claim 18 applies also to distinguish Claims 21-23, and the argument in respect of Claims 3 and 8 distinguishes Hodgkinson.

Claims 28-31 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson et al. in view of Sandsten et al. Claims 28-31 have been cancelled, thus rendering the claim rejections moot.

Claim 1 is rejected under 35 USC § 102(e) as being anticipated by Zwick. Applicants respectfully traverse this rejection.

The amendment to Claim 1 overcomes this rejection since Zwick detects thermal emission in a bandwidth outside of the solar radiation bandwidth.

Claim 2 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Zwick in view of Hodgkinson. Applicants respectfully traverse this rejection. Hodgkinson does not teach anything useful in terms of the bandwidth, as discussed above in relation to Claims 3 and 8. Further, Zwick teaches a completely different bandwidth and does not contemplate using variations in reflected solar radiation to detect ethane.

Rule 131 Declaration filed May 18, 2006. Applicants respectfully disagree with the Office Action and submit there is sufficient evidence to establish diligence on their part. Nevertheless, to advance the prosecution of the present application, applicants have distinguished the claimed invention as discussed above.

CONCLUSION

In view of the foregoing amendments and remarks, applicants submit that pending Claims 1-18 and 20-25 are in patentable condition. Early issuance of a notice of allowance is solicited. Should any issues remain needing resolution prior to allowance, the Examiner is invited to contact the undersigned counsel by telephone.

Respectfully submitted,

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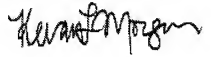

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